

Eight new species of *Proandricus* Plisko, 1992 from South Africa (Oligochaeta: Microchaetidae)

by

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ABSTRACT

Eight new South African earthworms of the genus *Proandricus* Plisko, 1992 are described and illustrated. Their relationship to other members of the genus is discussed. Keys to four newly proposed species groups (*beddardi*, *belli*, *timmianus* and *warreni* species groups) are presented.

New species: *biancae*, *ianthinos*, *magdae*, *mirificus*, *skeadi*, *zicsi* (Eastern Cape Province); *pajori* (Natal); *londti* (Transvaal).

INTRODUCTION

In order to promote research on megadrile Oligochaeta, a large collection of microchaetids has been assembled at the Natal Museum. In 1992 *Proandricus* Plisko was described, into which was placed 17 species (Plisko 1992). Further study of accumulated material has led to the discovery of an additional eight undescribed species. The descriptions of these are provided in this paper.

The species of *Proandricus* may be arranged into four groups based on the position of the spermathecal pores. Four separate keys coinciding with these species groups are presented in this paper to assist in distinguishing the new species from those handled by Plisko (1992). It should be noted that it is not possible to make completely reliable identifications on the basis of the keys alone, but that use should be made of the diagnoses and descriptions published here and in my earlier paper.

MATERIAL AND METHODS

Most of the material used in this paper was collected by me, sometimes with the assistance of Dr B. R. Stuckenberg (Director of the Natal Museum), Professor A. Zicsi (Loránd-Eötvös University, Budapest) or Mr I. Pajor (University of Natal, Pietermaritzburg). The holotype of *P. magdae* was donated to the Natal Museum by Miss Magda Szymanski.

Much of the material was collected by digging with a shovel and separating earthworms from the soil by hand. In the case of *P. skeadi*, most of the material was obtained with the use of a bulldozer (although some of the specimens were collected by hand-digging).

Earthworms, after washing, were narcotised with 15–45 % ethyl alcohol, then fixed in a 4 % formalin solution, in which they were kept for a few days; thereafter they were preserved in 75 % ethanol alcohol. Taxonomy is based on both external and internal characters; worms being studied with a Wild stereo-microscope. For

internal inspection specimens were dissected dorsally along the longitudinal axis (the 'classical' dissection). Specimens with contracted segments and those with septa 4/5 much thickened were dissected laterally between dorsal line and *ab* setal lines, along the longitudinal axis, including segments 2–25; this dissection allows assessment of septa thickness, the position of calciferous glands and the shape of spermiductal funnels, without damaging other internal tissue. To establish the exact position of the typhlosole, ventral dissection was necessary.

Specimens were photographed using a Wild M3Z photomicroscope while drawings were made with the aid of a drawing-tube attached to a Wild M5 stereomicroscope. Photographs of the biotope of *P. skeadi* were taken by Dr B. R. Stuckenberg.

Biological notes for *P. skeadi* were extracted from a copy of the original notes of Dr C. J. Skead, a previous Director of the Kaffrarian Museum in King William's Town.

GLOSSARY AND ABBREVIATIONS

The following terms, abbreviations, conventions and definitions, are employed in this paper.

$\frac{1}{2}$ – refers to a half of the unit (used in conjunction with circumference measurements - see *u* below).

1/*n* (immediately followed by a figure) – refers to that part of a segment covered by clitellar or tuberculum pubertatis tissue.

3/4 – indicates a position between segments; refers to intersegmental furrow or septum.

12,13–22,23 – this numerical convention denotes that the clitellum or tuberculum pubertatis is generally found on segments 13–22, but may in some individuals extend onto segments 12 and/or 23.

Annulus (pl. annuli) – a portion of a segment, superficially distinguished by transverse, external grooves.

Autotomy – self-amputation, usually the shedding of caudal segments, although in some species can occur in any posterior part of the body. Usually takes place under unfavourable conditions.

Calciferous glands – oesophageal glands (of differing shape, size and position) opening into the gut through the oesophageal pouches. (Other authors: glands of Morren or 'chylustasche').

Clitellate – those individuals with developed clitellum.

Clitellum – the region of the body-wall formed from several layers of highly glandular epidermal cells, which secrete material to form a cocoon.

Genital glands – the internal glands of unknown function; usually associated with papillae and tubercula pubertatis; variable in shape, appearance, size and position; may or may not be associated with setae or genital setae.

Holandric – characterised by the presence of two pairs of testes and two spermiductal funnels; one pair in segment 10 and another pair in segment 11.

JDP – J. D. Plisko.

NMSA – Natal Museum, Pietermaritzburg, South Africa.

Papilla (pl. papillae) – an external, protruding dermal structure of varying size, shape and appearance; usually a glandular swelling. A highly variable organ of uncertain function, and at present of controversial taxonomic value. (Other authors: genital papillae, genital tumescence in Lumbricidae).

Primary segmentation – the entire transverse division of the body along the longitudinal axis into segments separated internally by intersegmental septa and externally by intersegmental furrows.

Proandric – characterised by the presence of a single pair of testes in segment 10.

Ringlet – an external, superficial ring, formed by a deep furrow around a segment, when a secondary annulation occurs; can be simple or additionally annulated by extended superficial demarcation. The term ‘ringlet’ was introduced by Michaelsen for descriptions of annulation in South African Microchaetidae (Michaelsen, 1913*b c*). It was used to distinguish a longer portion of annulated segment, which usually itself is annulated by secondary, shallow demarcation. Michaelsen’s meaning is applied in this and my earlier papers (Plisko 1991*a b* 1992).

SA – South Africa.

Secondary annulation – the occurrence of any external, transverse furrows or grooves, demarcating segments externally into shorter portions; in microchaetids a tertiary annulation is observed, for which a distinction is made: for a longer portion of the segment, which often appears like a ‘real’ segment, the term ‘ringlet’ is employed. An ‘annulus’ may be formed by superficial demarcation of a segment, or a portion of a ‘ringlet’ subsequently demarcated by transverse, very shallow, complete or incomplete grooves.

Segment – the primary unit of segmentation; a portion of the body, internally separated by septa and externally divided by intersegmental furrows.

Segmentation – repetitive internal and external transverse, metameric divisions, along the longitudinal axis, throughout the whole body. (The loss of uniformity in internal/external segmentation occurs commonly in South Africa’s Microchaetidae creating some difficulty in establishing the number of segments, and the position of important external and internal features. The establishment of segment-number in the preclitellar part of the body needs special attention, often demanding a lateral, ‘doubled’ dissection).

Semimature – an individual with no clitellum, but having some characters of sexual maturity, usually the tubercula pubertatis, and/or developed spermathecae.

Septum (pl. septa) – an internal partition between segments, acting as a supporting membrane for internal organs; usually delicate, although in some anterior segments, thickened to varying degrees.

Seta (pl. setae) – any bristle of chitin, being a product of a single ectodermal cell at ental end of a tubular epidermal ingrowth. Setal formula is expressed in small letters: *a* = the most ventral seta; *b* = the seta next lateral to *a*; *c* = the seta next lateral to *b*; *d* = the seta next lateral to *c*; *aa* = median space ventrally between the two *a* setae; *ab* = space between *a* and *b* setae; *bc* = space between *b* and *c* setae; *cd* = space between *c* and *d* setae; *dd* = space between the most dorsal setae, usually given in ratio to body circumference (*u*). The distance between setae is expressed as a ratio or by symbols: for larger distance symbol > is used, for smaller <.

Spermiductal funnel – the ental end of sperm duct, through which sperm pass into a

lumen of the vas deferens on the way to male pore. The funnels occur in the same segment as the testes; their position is described as proandric or holandric. (Authors: male funnel or testis funnel).

Typhlosole – any longitudinal dorsal fold in the intestine projecting into the lumen of the gut.

u – circumference of the body; in SA microchaetids the distance between dd is usually equal, or close to equal, to $\frac{1}{2} u$.

TAXONOMY

Proandricus Plisko, 1992

Proandricus Plisko, 1992: 354. Type species: *P. thornvillensis* Plisko, 1992 by original designation.

Diagnosis: *Internal*: A single pair of testes and single pair of spermiductal funnels in segment 10 (proandric). Spermiductal funnels free or enclosed in testis sacs. One oesophageal gizzard in segment 7. Calciferous glands present, in region of 9–10. One pair of meganephridia per segment. Spermathecae in one pair or several pairs per segment, in one or more segments. Prostate absent. *External*: Setae lumbricine, paired. Nephropores in, or near, cd setal lines. Male pores intraclitellar. Paired female pores on 14. Clitellum saddle-shaped. Tubercula pubertatis present. Papillae and genital glands present or absent. Spermathecal pores in one or in several intersegmental furrows. Dorsal pores absent.

Key to the species groups of *Proandricus*

Recent investigation indicates that *Proandricus* may be divided into convenient groups on the basis of the position of the spermathecae and spermathecal pores. The identified species groups are named after the oldest known taxon within each group.

- 1 Spermathecae only in one segment; spermathecal pores in one intersegmental furrow (10/11 or 12/13) **warreni** species group
- Spermathecae in two or more segments; spermathecal pores in two or more intersegmental furrows 2
- 2 Spermathecae in two segments; spermathecal pores in two intersegmental furrows 3
- Spermathecae in three or more segments; spermathecal pores in three intersegmental furrows (includes *lesothoensis* with an unconfirmed number of spermathecae – three or two) **timmianus** species group
- Note: P. timmianus* has three additional, vestigial spermathecae close to septa 8/9, 9/10, 10/11.
- 3 Spermathecal pores in 11/12 and 12/13 intersegmental furrows **belli** species group
- Spermathecal pores in 12/13 and 13/14 furrows **beddardi** species group

The *P. warreni* species group

Key to the species of the *warreni* species group

- 1 Spermathecal pores only in 10/11 **pajori** sp. n.
- Spermathecal pores only in 12/13 2

- 2 Clitellum on 12–20 **warreni** (Michaelsen, 1913)
 – Clitellum on 12–23 3
 3 Tubercula pubertatis on 1/n14–18 **londti** sp. n.
 – Tubercula pubertatis on 15–16 **zicsi** sp. n.

***Proandricus pajori* sp. n.**

Figs 1–2

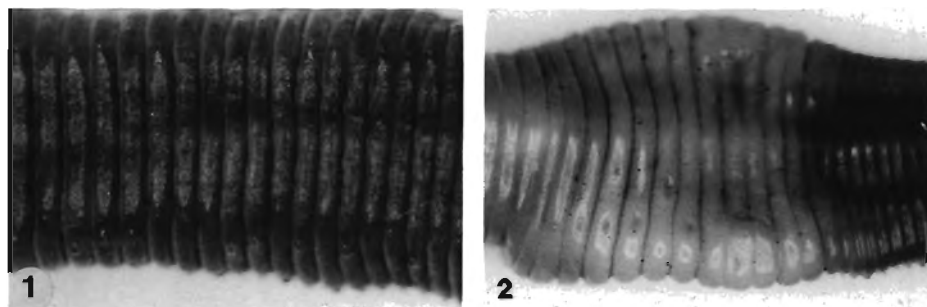
Etymology: Named for Mr Istvan Pajor who has assisted in the collection of earthworm material from the Drakensberg mountains.

Material examined: **Holotype:** NMSA/Olig. 01202/1, clitellate, Natal, Drakensberg, Cathedral Peak (28°55'S:29°09'E), Site I, catchment 9, ca 1820 m asl, in the afromontane belt; clayey, black, moist soil, under scrub forest dominated by *Leucosidea sericea*, found in the layer of 5–15 cm, 11 December 1991, A. Zicsi & I. Pajor leg. **Paratypes:** NMSA/Olig. 01202/2–12, 2 clitellate and 9 juvenile, collected together with holotype.

Known only from the type locality.

External characters

General: Body cylindrical. **Colour:** In life – dorsally dark grey with pinkish tint, ventrally light grey. Alcohol preserved – dorsally and ventrally light grey. **Dimensions:** Preserved and slightly contracted: holotype (abscised) 40+ mm long, 4 mm wide at 10, 6 mm at tubercula pubertatis; paratypes: clitellate – 39–56 mm long, 3–4 mm wide at 10, 5–6 mm at tubercula pubertatis; juveniles – 26–42 mm long, 2–3 mm wide. **Segment number:** Holotype 98+, paratypes 90–122. **Prostomium:** small. **Segmentation:** Secondary annulation present; 1 and 2 simple with longitudinal grooves; 3 simple; 4–8 with 2 simple ringlets similar in size and appearance; 9 with 2 ringlets, first longer than second; postclitellarly simple or irregularly annulated. **Setae:** Medium size, conspicuous; closely paired: $ab = cd$, $aa > bc$, $dd = \frac{1}{2}u$; at segment 26 $aa : bc = 15 : 10$; at segments 10–19 five to seven pairs of ab in abnormal arrangement, in shifted position between bc setal lines; in one juvenile individual a similar abnormality in arrangements of ab setae on posterior segments was noted (Fig. 1). **Nephridial pores:** Conspicuous, first pair in 2/3 intersegmental



Figs 1–2. *Proandricus pajori* sp. n. 1. Variation in position of ab setae in postclitellar part. 2. Clitellar region, ventrally.

furrow. *Female pores*: on 14, below *c* setae. *Male pores*: Evident, on 17, on tubercula pubertatis. *Spermathecal pores*: One pair of small openings, in 10/11 intersegmental furrow.

Clitellar region (Fig. 2): *Clitellum*: Saddle-shaped, segmented; holotype on 12–20, paratypes on 12–21; laterally extends to *cd* setal lines. *Tubercula pubertatis*: On 1/n16–1/n20,20; commence at clitellar lateral edge, extending below *a* setal lines. *Papillae*: Single or paired, containing *ab* setae, on 11, 12, 13, 14.

Internal characters

Septa: 4/5 is thickened the most, muscular, although, soft and elastic; 5/6 and 6/7 thin, although strong; 7/8 thickened less than 4/5; 8/9 thickened less than 7/8; other septa thin, strong. *Gizzard*: In 7, muscular. *Calciferous glands*: Lateral appendages, dorsally and ventrally separated; in 9. *Intestine*: Commences in 13. *Typhlosole*: Originates in 23, terminates 52–53. *Dorsal blood vessel*: Doubled in 5–8, separated. In one paratype doubled when crossing septa; 9 cordiform organ; single after 9. *Paired dorso-ventral vessels*: In 5–11, gradually enlarging. *Nephridia*: Meganephridia; large oblong caeca with long, coiled loops.

Reproductive organs: *Spermiductal funnels*: Proandric arrangement; a pair of large funnels, very much ventrally, close one to another; in 10. Large, evident vasa deferentia run to 17, entering into body wall, and to male pores. *Seminal vesicles*: Very large sacs with few divisions, closely connected to testis sac; in 10, projecting into 11 and 12. *Spermathecae*: One pair of very large ampullae, oval with long neck; close to septum 10/11. *Ovaries*: Not seen; probably embedded in tissue of 13. *Genital glands*: Paired or single, flat glands; consisting *ab* setae and corresponding with papillae.

Biological notes: This species was found in indigenous montane vegetation at an altitude over 1800 m, together with a peregrine species of *Amyntas* Kinberg, 1867. It is difficult to establish if *pajori* is indigenous to its type locality, or was introduced to the catchment area together with the foreign species.

Discussion: The relationship of this species to others in the genus is uncertain. The dorsal blood vessel being doubled when crossing septa 4/5–8/9 in one individual, and the position of the spermathecae in segment 10, with their openings in 10/11, makes this species distinctive. There are only two other species, *lesothoensis* and *timmiianus*, with spermathecae close to septa 10/11. In *timmiianus* spermathecae were seen by Michaelsen (1933) close to septa 8/9, 9/10 and 10/11 only on histological slides, as vestigial ampullae, resembling spermathecae; in *lesothoensis* spermathecal pores were found in 9/10 and 10/11, or 9/10, 10/11 and 11/12. If this spermathecal location is correct it is possible that *pajori* is related to *lesothoensis*. The type of *lesothoensis* was not available for study. As no histological study has been conducted on *pajori* more information is needed before further comments are possible.

***Proandricus londti* sp. n.**

Figs 3–4

Etymology: Named for Dr J. G. H. Londt, Assistant Director of the Natal Museum.

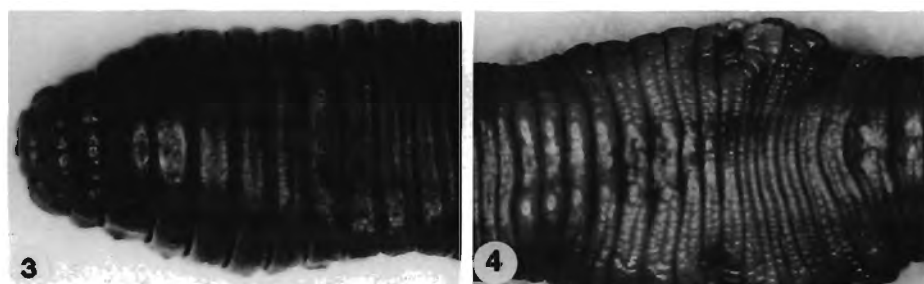
Material examined: **Holotype**: NMSA/Olig. 01250/1, clitellate, found in garden soil,

Irene (25°53'S;28°13'E), Transvaal, 7 July 1975, JDP leg. **Paratypes:** NMSA/Olig. 01250/2–6, 5 clitellate, collected with holotype.

Known only from the type locality.

External characters

General: Body cylindrical. **Colour:** Alcohol preserved – pink (presumably discoloured being long preserved). **Dimensions:** Preserved and contracted: holotype 55 mm long, 2,5 mm wide at segment 10, 3 mm at tubercula pubertatis. Paratypes: 34+ mm (abscised) – 79 mm (stretched) long, 2,5 mm wide. **Segment number:** Holotype: 152; paratypes 72+ (abscised) – 250. **Prostomium:** small. **Segmentation:** Secondary annulation present (Fig. 3); 1 and 2 simple with longitudinal grooves; 3 simple; 4–8 with 2 simple ringlets of similar size and appearance; 9 with 2 annuli; 10–11 annulated with incomplete lines; postclitellarly simple or randomly annulated. **Setae:** Minute; first pairs of *cd* on 2, then on first ringlet of all annulated segments; $aa < bc$; $ab = cd$; $dd = \frac{1}{2}u$. **Nephridial pores:** Conspicuous, first pair in 3/4 intersegmental furrow, in *cd* setal lines. **Female pores:** Not visible; probably covered by contracted muscles of segment 14. **Male pores:** Two large grooves indicate presence of male pores in 15/16 or 16/17, but exact position is unknown. **Vasa deferentia** in dissected specimens run up to septum 15/16 where they enter tissue of genital gland. It is not certain if the ducts join the large opening in 15/16 or extend through gland of 15 and go into 16/17. **Spermathecal pores:** In 12/13 intersegmental furrow; two, very close one to another, small openings in *cd* setal lines.



Figs 3–4. *Proandricus londti* sp. n. 3. Anterior part with prostomium, simple segments 1–3, and the subsequent segments with two simple ringlets. 4. Clitellar region, ventrally.

Clitellar region (Fig. 4): **Clitellum:** Saddle-shaped, with intersegmental furrows, on 12–23. **Tubercula pubertatis:** Below lateral edges of clitellum, extending up to *ab* setal lines; clearly segmented, on 11/14–19: 11/14 as hemispherical glands, followed by glandular swellings, divided by narrow grooves on 15–16, and extended into 17–18; glands of 16, 17, 18 are in shape of concavity covered by overlapped edges of segments 16–18. **Papillae:** Three groups of papillae were noticed: on 10 and 11 large, paired, in *ab* setal lines; on 12 a pair of medium sized glands, containing *cd* seta, however, shifted close to *ab* setal lines; on 20–24 or 22–25 paired, small glands in *ab* lines.

Internal characters

Septa: 4/5, 7/8 and 8/9 thickened moderately, with equal thickness. *Gizzard*: In 7; spherical. *Calciferous glands*: In 9; ventrolateral, small appendages, connected to oesophagus by narrow, short tubes; separated dorsally and ventrally. *Intestine*: Commences in 13. *Typhlosole*: Commences in 18–19; terminates in area of 144. *Dorsal blood vessel*: Doubled in 6–9; single in 5, crossing septa, and posteriorly to 9. *Paired dorso-ventral vessels*: 6–11, gradually increasing in size. *Nephridia*: Meganephridia; one pair per segment.

Reproductive organs: *Spermiductal funnels*: Proandric arrangement; in 10, closely connected to vesiculae seminales. *Seminal vesicles*: Large sacs in 10 and 11. *Spermathecae*: Two pairs of large ampullae, enclosed in one capsule; in 12/13. *Ovaries*: Not seen. Probably embedded in body tissue of 13. *Genital glands*: In holotype: medium-sized glands, in 13, 14, 15, 16.

Biological notes: This species was collected from soil in a vegetable garden. It is not known if *londti* is indigenous to the Transvaal or was introduced from some other area of SA. It was found to be active in the middle of winter when night temperatures sometimes fall below zero. Sperm was observed in spermathecal ampullae; this suggests that the species was sexually active during winter, irrespective of low temperature and dry season. The garden was probably watered, giving sufficient moisture for existence and activity.

Discussion: Similar to *warreni* and *zicsi*. All three species have two pairs of spermathecae in only one segment, and spermathecal pores in 12/13 intersegmental furrow. However, the position of the clitellum differs from that of *warreni*. The shape of the tubercula pubertatis differs in these three species, and in *londti* is remarkable in form.

Proandricus zicsi sp. n.

Figs 5–6

Etymology: Named for Professor A. Zicsi, Loránd-Eötvös University, Budapest, who assisted in the collection of the type specimens during a joint expedition to the Cape Province in 1991.

Material examined: **Holotype**: NMSA/Olig. 01142/1, complete, clitellate, found in aestivation, at a depth of ca 30 cm, in very dry soil, 15 km south of Addo Elephant Park (33°29'S:25°45'E), Cape Province, 24 November 1991, JDP & A. Zicsi leg.

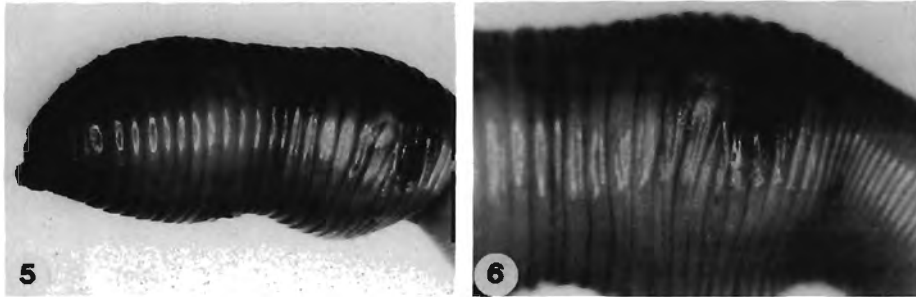
Paratype: NMSA/Olig. 01142/2, 1 abscised, found together with holotype.

Known only from the type locality.

External characters

General: Body cylindrical, preclitellar segments much contracted. **Colour**: In life – dorsally dark grey, ventrally light grey. Alcohol preserved – grey, with blackish tint. **Dimensions**: Holotype, preserved, contracted, 86 mm long, 6 mm wide at segment 10, 8 mm at tubercula pubertatis. **Segment number**: Holotype 254, paratype (abscised) 153+. **Prostomium**: Short. **Segmentation**: Secondary annulation present (Fig. 5); 1 and 2 simple, short, with longitudinal grooves; 3 simple, smooth, with size of first two segments together; 4–8 with 2 simple ringlets, similar size and

appearance; 9 with 2 ringlets of different size: first ringlet longer than second. Postclitellar segments contracted, simple, or randomly annulated. *Setae*: Minute; first pairs on 3, than on first ringlet of all annulated segments. *Nephridial pores*: Minute, first pair in 3/4 intersegmental furrow. *Female pores*: Not visible; probably covered with contracted muscles of segment 14. *Male pores*: In 14/15 intersegmental furrow, with swollen glands and thin grooves. *Spermathecal pores*: In 12/13 intersegmental furrow; very close one to another.



Figs 5–6. 5. *Proandricus zicsi* sp. n. 5. Anterior part laterally, with prostomium, simple segments 1–2 with longitudinal grooves, simple segment 3, and 4–9 with two simple ringlets. 6. Clitellar region ventro-laterally, with tuberculum pubertatis.

Clitellar region (Fig. 6): *Clitellum*: Saddle-shaped, segmented, on 12–23. *Tubercula pubertatis*: Commence on the lateral border of clitellum, extending below a setal lines; flat fields of nearly trapezoidal shape; on 15–19. *Papillae*: Very small glands on 10–23.

Internal characters

Septa: 4/5, 5/6 and 6/7 thin, strong, not thickened; 7/8 and 8/9 thickened very much, muscular. *Gizzard*: In 7, spherical. *Calciferous glands*: In 9; large lateral appendages, clearly separated dorsally and ventrally. *Intestine*: Commences in 13. *Typhlosole*: Commences, together with intestine, in 13, and extends to 162. *Dorsal blood vessel*: Doubled in 6–9: 6–7 close, 8 separated, 9 cordiform; single in 5, crossing septa, and posterior to 9. *Paired dorso-ventral vessels*: 5–7 thin tubes, 8–11 gradually enlarged. *Nephridia*: Meganephridia; one pair per segment; coiled large loops with oblong V caeca.

Reproductive organs: *Spermiductal funnels*: Proandric arrangement; one pair in 10, closely attached to first pair of vesiculae seminales. *Seminal vesicles*: Large sacs commencing in 10, extend into 11. *Spermathecae*: Two pairs of large, oblong ampullae, very close one to another, with openings in only one intersegmental furrow 12/13. *Ovaries*: Small, rosette-shaped, in 13. *Genital glands*: A pair per segment, small, round, flat glands; holotype: 14 pairs in 10–23; paratype: 15 pairs in 9–23. **Biological notes**: This species was found in very dry, hard soil, near a road. Both specimens were in aestivation, contracted and coiled. In the neighbouring area were old casts probably excreted by individuals of this species. No other species were

recorded from the locality. The presence of sperm in spermathecae indicates sexual activity before aestivation.

Discussion: Similar to *warreni* and probably to *londti*. All three species have two pairs of spermathecae in 12/13 intersegmental furrow. These species differ in the position of the clitellum, shape of tubercula pubertatis and position of typhlosome.

The *belli* species group

Key to the species of the *belli* species group

- 1 Septum 4/5 extremely thickened, at least 10–15 times thicker than 7/8 or 8/9 2
- Not so. – Species keying out here include *belli* Benham, 1892; *colletti* Michaelsen, 1907; *gracilis* Michaelsen, 1907; *marleyi* Michaelsen, 1928; *babanango* Plisko, 1992; *bulwerensis*, Plisko, 1992; *entumeni* Plisko, 1992; *jasoni* Plisko, 1992; *thornvillensis* Plisko, 1992, and may be identified using an earlier key (Plisko 1992).
- 2 Clitellum commences on 12, terminates on 23 **magdae** sp. n.
- Clitellum commences on 12, terminates after 23 3
- 3 Clitellum terminates on 24,25 **modestus** (Michaelsen, 1899)
- Clitellum terminates on 28,29 **skeadi** sp. n.

Proandricus magdae sp. n.

Figs 7–9

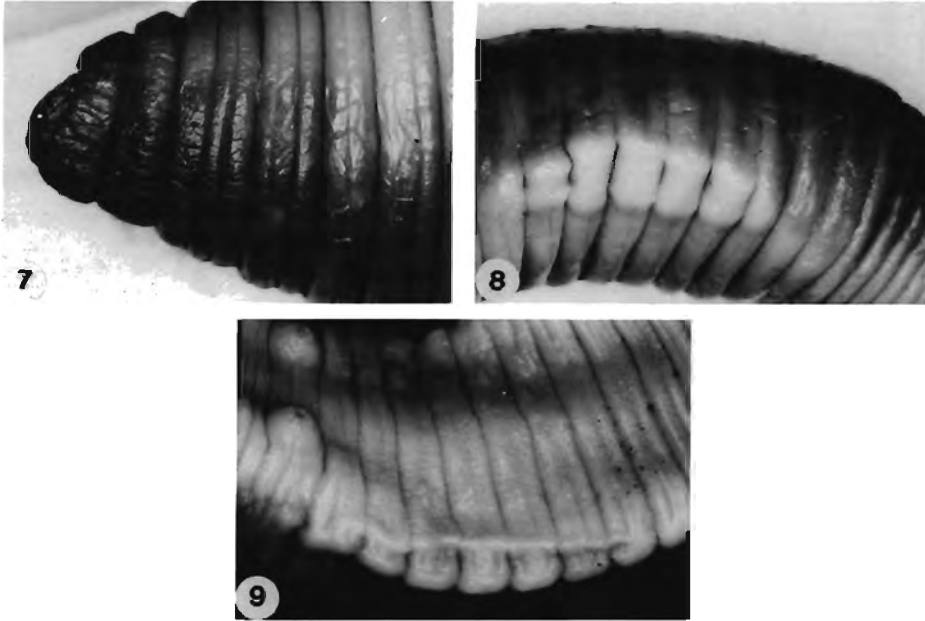
Etymology: Named for Miss Magda Szymanski, who collected the holotype.

Material examined: **Holotype** NMSA/Olig. 01240, from garden soil, collected after heavy rain, Dohne Research Station, 8 km NW of Stutterheim (32°32'S:27°29'E), Cape Province, 4 April 1991, M. Szymanski leg. **Paratypes:** NMSA/Olig. 01217, 2 clitellate, abscised, from the same locality as holotype, 18 November 1991, M. Szymanski leg.; NMSA/Olig. 00521 from garden soil of Mrs Denise du Preez's garden, Stutterheim (15 Cullendon Str.), 1 clitellate specimen, 19 January 1990, JDP & B. R. Stuckenberg leg.

External characters

General: Body cylindrical, in life – firm and muscular. Preserved in alcohol – softened, slightly contracted. **Colour:** In life – dorsally brown with violet tint; ventrally grey. Alcohol preserved – dorsally grey with brownish-violet tint. **Dimensions:** Holotype – preserved and stretched 217 mm long, 13 mm wide at 10, 16 mm at tubercula pubertatis; paratype – 168 mm long, 9 mm wide at 10, 13 mm at tubercula pubertatis. **Segment number:** Holotype 294; paratypes 98+ (abscised) – 202 (with regenerating segments). **Prostomium:** Prolobous, with a few longitudinal grooves. **Segmentation:** Secondary annulation present (Fig. 7); 1–2 simple, with longitudinal grooves; 3 with 3 annuli of different length; 4–9 with 2 ringlets, each annulated irregularly into 2 or 3 short annuli; 10–11 short, demarcated with transverse, incomplete grooves; clitellar segments ventrally multi-annulated; postclitellar short, simple. **Setae:** Minute, closely paired; first pairs of *cd* on 2.

Nephridial pores: Conspicuous in *cd* setal lines; first pair in 3/4 intersegmental furrow. *Female pores*: A pair of small conspicuous openings on 14, in front of *ab* setale. *Male pores*: In 14/15 intersegmental furrow. *Spermathecal pores*: A pair of large pores, in 11/12 and 12/13 intersegmental furrows.



Figs 7-9. *Proandricus magdae* sp. n. 7. Anterior part ventro-laterally, with prostomium, simple segments 1-2 with longitudinal grooves, 3 annulated into three short annuli, 4 with two annulated ringlets and first ringlet of segment 5. 8. Tuberculum pubertatis, laterally. 9. Paired papillae of segment 13 and subsequent segments.

Clitellar region: *Clitellum*: Saddle shaped, yellowish-grey, with clear intersegmental furrows; ventral edges extended slightly below *cd* setal lines; on 12-23. *Tubercula pubertatis* (Figs 8-9): On ventral edges of clitellum, oblong ridges, medially with shallow, longitudinal furrow, and narrow glandular rim; demarcated by intersegmental furrows; on 1/n14-1/n20.

Internal characters

Septa: 4/5 much thickened, enormously massive, muscular, connected to body wall through the whole length of segment 4; 7/8 and 8/9 thickened moderately, muscular, both septa with equal thickness. *Gizzard*: In 7; bell-shaped. *Calciferous glands*: A pair of large, hemispherical glands, laterally adherent to oesophagus in 9; pushing septum 9/10 occupy large part of 10; clearly separated dorsally and ventrally. *Intestine*: Commences in 12. *Typhlosole*: Commences in 19 or 20; terminates in area of 160. *Dorsal blood vessel*: Doubled in 5-9; in 5-7 doubled, not separated; 8 doubled, separated; 9 cordiform; single when crossing septa and posterior to 9. *Paired dorso-ventral vessels*: 5-6 thin tubes; 7-11 enlarged, moniliform. *Nephridia*: Meganephridia; coiled loops with V-shaped, large caeca.

Reproductive organs: *Spermiductal funnels*: Proandric arrangement; in 10, a pair of large funnels, enclosed in sacs, closely connected to vesicula seminales. *Seminal vesicles*: One pair of small vesicles, in 10. *Spermathecae*: In 2 segments; 2 oblong, closely situated ampullae on both sides of each segment; openings in 11/12 and 12/13 intersegmental furrows. *Genital glands*: No genital glands were found.

Biological notes: This species was collected during the rainy season from garden soil in Stutterheim and in the close neighbourhood of the type locality. Its casts are very large and hard, resembling these of *skeadi* seen at Debe Nek. According to local informants, specimens emerge on the ground surface after heavy rain.

Discussion: *P. magdae* is similar to *skeadi* and *modestus*. These species have the spermathecal openings in 11/12 and 12/13 intersegmental furrows, and a very much thickened, extremely strong, muscular septum 4/5. It differs in the number of spermathecae, position of clitellum and shape of tubercula pubertatis. Although type localities are different for *magdae* and *skeadi*, both species were found together at Stutterheim. *P. modestus* was described from Port Elizabeth.

Proandricus skeadi sp. n.

Figs 10–13

Etymology: Dedicated to Dr C. J. Skead, Director of the Kaffrarian Museum in King William's Town between 1950–1961. His interest in the 'giant worms' of the Debe Nek area has led to an increased public awareness of earthworms. Although Skead initiated the publication of numerous notes on 'giant earthworms' in both local magazines and newspapers, the species concerned has remained undescribed.

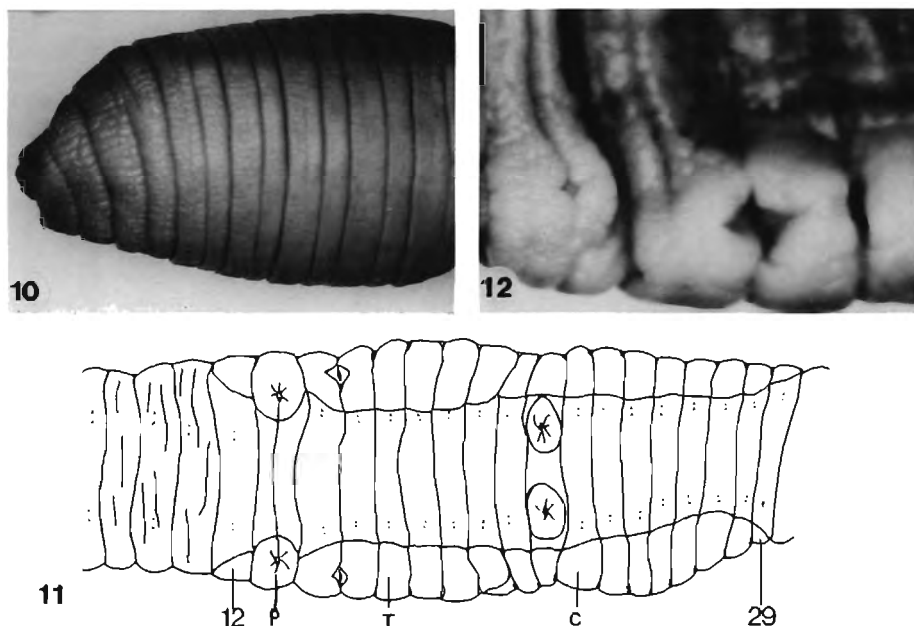
Known from the type locality at Debe Nek, also the vicinity of King William's Town, Pirie Forest, and Stutterheim.

Material examined: **Holotype**: NMSA/Olig. 01124/1, clitellate, abscised at segment 312, grassland, ca 1 km of large casts, near pond, wet soil, 23 km NW of King William's Town, following national road 63, opposite Debe Nek (32°48'S:27°12'E) railway station, dug out by hand-shovel, 21 November 1991, JDP & A. Zicsi leg.; **Paratypes**: NMSA/Olig. 01124/2, 4 semimature, 13 abscised various parts, collected with holotype; NMSA/Olig. 00542, 2 semimature abscised anterior parts, 10 juveniles and 1 cocoon, from holotype locality, 20 January 1990, JDP & B. R. Stuckenberg leg.; NMSA/Olig. 00552, 2 semimature anterior abscised parts, 10 juveniles, 2 posterior abscised parts, Middledrift (32°48'S:27°01'E), 26 km NW of King William's Town, grassland, dry soil, dug out by hand-shovel, 20 January 1990, JDP & B. R. Stuckenberg leg.; NMSA/Olig. 00663/1–4, 3 abscised anterior parts, 1 juvenile complete, 15 juveniles or semimature abscised parts, Zamyokwa, 3 km W of Debe Nek, from fallow ground, dug out by road bulldozer, 6 November 1990, JDP leg.; NMSA/Olig. 00664, 1 abscised at 43 segment, clitellate; NMSA/Olig. 00665, 1 abscised at 146 segment; NMSA/Olig. 00666, 1 juvenile complete; NMSA/Olig. 00667, 2 semimature abscised anterior and 20 posterior parts; NMSA/Olig. 00668, 2 semimature complete, 13 juveniles; all from holotype locality, from fallow ground next to road, dug out by bulldozer, 6 November 1990, JDP leg.; NMSA/Olig. 01242/1–2, 2 clitellate, Dohne Research Station, 8 km N of Stutterheim (32°32'S:27°29'E), from lawn, collected after heavy rain, 19 November 1991, K.

Szymanski leg. Other material (no type status): NMSA/Olig. 00674–00675, 6 juveniles and 14 abscised anterior parts; Zamyokwa, 3 km W of Debe Nek, from fallow ground, dug out by road bulldozer, 6 November 1990, JDP leg.; NMSA/Olig. 00669, NMSA/Olig. 00673: 2 semimature anterior parts, 12 juveniles complete, 12 abscised anterior and 60 various abscised parts, from Pirie Forest (32°45'S:27°20'E), primary grassland being prepared for tree plantation, dug out by mechanical plough, 7 November 1990, JDP leg.

External characters

General: Body cylindrical, slightly flattened posteriorly, firm. *Colour*: In life – dorsally greyish-brown with dark green tint, ventrally light brown. Alcohol preserved – brown, with greenish colour fading during preservation; long time preserved – light brown, dorsally brownish-grey. *Dimensions*: In life, holotype 540+; paratype juvenile complete *ca* 1200 mm long, 8 mm wide. Preserved and contracted: holotype 274+ mm long, 12 mm wide at 10, 15 mm at tubercula pubertatis. *Segment number*: Holotype 312+; paratypes up to 764. *Prostomium*: Prolobous, with longitudinal grooves. *Segmentation*: Secondary annulation present (Fig. 10); some differentiation in annulation was noted in individuals; usually: 1 and 2 simple with longitudinal grooves; 3 with 2 or 3 annuli, simple or with longitudinal or transverse grooves; 4–8 with 2 ringlets similar size, each ringlet annulated with 2 or three annuli; 9 with 2 ringlets, first longer than second; 10–11 short, with 2 or 3 irregular annuli;



Figs 10–12. *Proandricus skeadi* sp. n. 10. Anterior part laterally, with prostomium, single segments 1–2 with longitudinal grooves, segment 3 annulated into incomplete two annuli, segments 4–5 with two annulated ringlets, and part of segment 5. 11. Clitellar region ventrally: C = clitellum; T = tuberculum pubertatis; P = papilla; numbers refer to segments. 12. Papilla of 13.

postclitellar with irregular transverse annulation. *Setae*: Minute; closely paired; on first seven segments embedded in body tissue; sporadically could be seen on 3 or 4; more clearly seen after 7. *Nephridial pores*: Conspicuous; first pair in 3/4 intersegmental furrow, in *cd* setal lines. *Female pores*: Conspicuous; in front of *b* seta of 14. *Male pores*: In 14/15 intersegmental furrow, with a rhomboid cavity in 1/n14–1/n15 and bordering glandular swellings. *Spermathecal pores*: Conspicuous, in 11/12 and 12/13; a pair per segment; large, lenticular.

Clitellar region (Fig. 11): *Clitellum*: Holotype: 12–28; paratypes: 12–27, 28, 1/n29, 29; saddle-shaped, brown with greenish or blackish tint, with clear intersegmental furrows; on some specimens marked only with brown-blackish colour. *Tubercula pubertatis*: Oblong, swollen ridges, clearly divided by intersegmental furrows; on 14, 1/n14–19; commence along lateral border of clitellum, extending slightly above *b* setal lines. *Papillae* (Fig. 12): Holotype: Oval, with little nipples; single on 13, paired on 21 and 22. Paratypes: Variable in number, size, shape and position; single or paired, on one or a few of the following segments: 9, 10, 12, 13, 21, 22, 26; usually as glandular swellings, sometimes with little nipples, often simple; in *ab* or *cd* setal lines.

Internal characters

Septa: 4/5 thickened enormously, muscular, massive with many layers of musculi; at least 15 times thicker than 7/8; 5/6 and 6/7 thin, although strong; 7/8 and 8/9 thickened moderately, muscular; in some younger specimens 8/9 slightly thinner than 7/8. Other septa thin, not muscular, strong. *Gizzard*: In 7, large. *Calciferous glands*: In 9–10; large, spherical, lateral appendages, separated dorsally and ventrally, connected to oesophagus with narrow short tube at septa 9/10. *Intestine*: Commences in 13. *Typhlosole*: Commences at 26–28, terminates in 254–298. *Dorsal blood vessel*: Doubled in 5–9; 5–7 close; 8 separated; 9 cordiform. Single in 4, crossing septa and posterior to 9. *Paired dorso-ventral vessels*: 5–8 thin tubes, 9–11 enlarged, moniliform. *Nephridia*: Meganephridia. One pair per segment; large coiled loops with large, oblong caeca.

Reproductive organs: *Spermiductal funnels*: Proandric arrangement; one pair of large funnels, enclosed in large, thick sac, in 10. *Vasa deferentia*: Single ducts run up 15, where enter body wall. *Seminal vesicles*: Large sacs in 10 and 11. *Spermathecae*: Various size and shape; variability, probably, results from different stages of maturity; one pair of ampullae per segment, with openings near to septa 11/12 and 12/13. In one specimen, however, one additional spermatheca was found at left side in 12/13. *Ovaries*: Rosette-shaped, small, at the edge of septum 13/14. *Genital glands*: Small glands, corresponding with tubercula pubertatis and with papillae.

Biological notes: The soil in which this species was found was of a heavy clayey type. Numerous accumulations of extremely large casts (Fig. 13) were found on the ground surface in grassland and under trees. A study of cast structure shows that they are produced gradually over long periods, by one or more individuals. The height of a cast can reach 240 mm, with an average diameter of 40–90 mm; emergence holes were in the centre or on the side of the cast, and had diameters of ca 12 mm.



Fig 13. Casts at Debe Nek, Cape Province; presumably, the majority of casts was erected by *Proandricus skeadi* sp. n. Photograph was taken in January 1990. (By courtesy of Dr B. R. Stuckenberg).

The observations made by Dr Skead between 1958–1971 are the most comprehensive source of biological information for *skeadi*. According to his notes this species is very active during rainy weather, producing numerous casts on the ground surface. Fresh casts were recorded when soil temperature dropped below 7°C; they were also recorded in the middle of June 1971 (ie. close to midwinter) when the soil had been dampened by an unseasonable shower. No fresh casts were observed during a long drought of 17 months (between March 1969 and August 1970). The drought was broken over 25–28 August 1970 with a precipitation of 355,5 mm (nearly 58 % of the average annual fall for King William's Town area). This rain failed to dissolve the old, dry casts. Fresh surface casts were noticed on 8 September 1970, over a week after the heavy rain had soaked the soil.

Dr Skead's notes, correspondence and copies of articles from newspapers, magazines and journals, are housed in the Library of the Kaffrarian Museum, King William's Town. Selected photocopies are also available in the Natal Museum Library.

Discussion: Similar to *modestus* and *magdae*. These three species have septa 4/5 enormously thickened and the openings of spermathecae in 11/12 and 12/13 intersegmental furrows. They differ, however, in body dimensions, number of segments, position of clitellum and tubercula pubertatis. *P. magdae* has two pairs of spermathecae per segment, whereas *modestus* and *skeadi* have only one pair per segment.

The *beddardi* species groupKey to the species of the *beddardi* species group

- 1 Two septa: 10/11 and 11/12 thickened **brincki** (Sciacchitano, 1967)
- Three septa: 4/5, 7/8 and 8/9 thickened 2
- 2 Clitellum commences on 12, terminates on 20; tubercula pubertatis on 1/n14–19 **mirificus** sp. n.
- Not so. – Species keying out here include *beddardi* Benham, 1886; *marenzelleri* Rosa, 1897; *humiculator* Michaelsen, 1912, which may be identified using an earlier key (Plisko 1992).

***Proandricus mirificus* sp. n.**

Figs 14–16

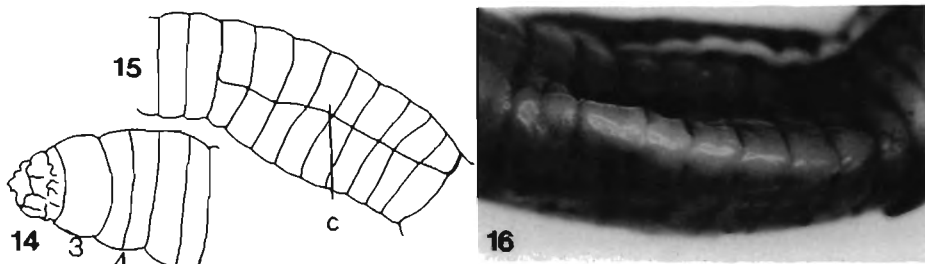
Etymology: L. masculine *mirificus* - causing wonder. Refers to the large spermathecal funnels of segment 10 which extend into segment 11.

Material examined: **Holotype:** NMSA/Olig. 00533, mature, 16 km SW of Stutterheim (32°32'S:27°29'E), following road 358, at ca 1000 m asl, on the bank of local stream under rotten bark, 19 January 1990, JDP & B. R. Stuckenberg leg.

Paratype: NMSA/Olig. 1116, 6 km from Stutterheim, Kologha Forest, ca 750 m asl, from black soil, 20 November 1991, JDP & A. Zicsi leg.

External characters

General: Body cylindrical, flattened at clitellum. **Colour:** In life – dorsally dark violet, ventrally yellowish. Alcohol preserved – dorsally violet-grey, ventrally whitish-grey. **Dimensions:** Holotype preserved and contracted 68 mm long, 5 mm wide at 10, 8 mm in region of tubercula pubertatis. **Segment number:** Holotype 81. **Prostomium:** Prolobous, large. **Segmentation:** Secondary annulation present: 1–2 simple, short, not distinguished one from another (Fig. 14), with longitudinal grooves; 3 simple, long as 1 + 2; 4–9 with 2 simple ringlets, similar in size and



Figs 14–16. *Proandricus mirificus* sp. n. 14. Anterior part: numbers refer to segments. 15. Clitellar region, laterally: c = clitellum. 16. Clitellar region ventro-laterally.

appearance; 10 and the following simple. **Setae:** Closely paired: $ab = cd$, $aa > bc$, $dd = \frac{1}{2} u$; ab of segment 13 in the line of ventral edge of tubercula pubertatis. **Nephridial pores:** First pair in 3/4. **Female pores:** Not seen; probably embedded in body tissue in

- 3 Tubercula pubertatis on 1/n16–1/n20 **lesothoensis** (Reinecke & Ryke, 1969)
 – Tubercula pubertatis on 1/n14–19 **ianthinos** sp. n.

***Proandricus biancae* sp. n.**

Fig. 17

Etymology: Named for my Natal Museum colleague Mrs Bianca Lawrence.

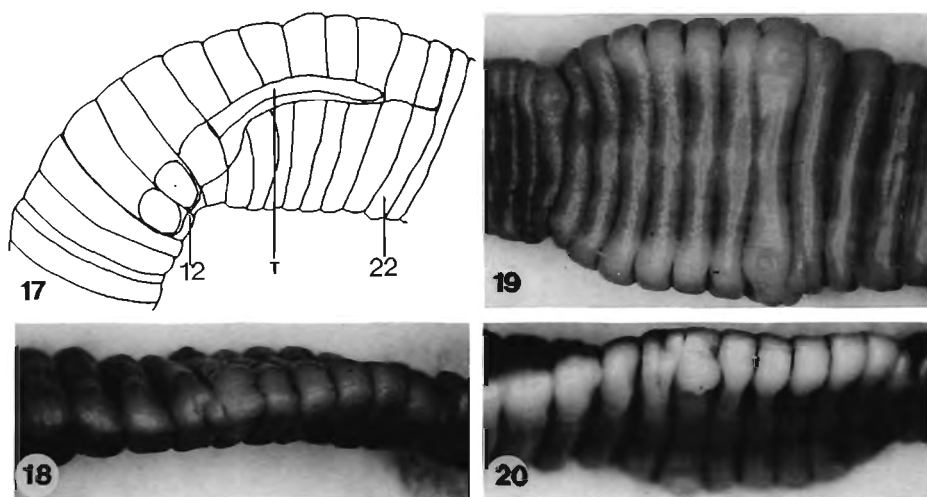
Material examined: **Holotype:** NMSA/Olig. 01127/1, clitellate, examined externally; found in dry soil, at depth of 60 cm, in roadside ditch, 10 km W of Alice (32°27'S:26°52'E), Cape Province, 21 November 1991, JDP & A. Zicsi leg.

Paratypes: NMSA/Olig. 01127/2–4, 3 clitellate abscised examined externally and internally; NMSA/Olig. 01127/5, 1 juvenile, collected with holotype.

Known only from the type locality.

External characters

General: Body cylindrical. **Colour:** Alcohol preserved – dorsally and preclitellarly greyish with reddish tint, ventrally yellowish-grey. **Dimensions:** Holotype 119 mm long, 4 mm wide at 10 and 6 mm in region of tubercula pubertatis. Paratypes 70+ mm long; juvenile 84 mm long, 3 mm wide. **Segment number:** Holotype 223; juvenile paratype 224 mm. **Prostomium:** Prolobous, small. **Segmentation:** Secondary annulation present; 1 and 2 simple, similar in size and appearance, both with longitudinal grooves; 3 simple; 4–8 with 2 simple ringlets, similar in size and appearance; 9 with 2 ringlets, first longer than second; 10 and postclitellar simple. **Setae:** Small; first pairs on 3. **Nephridial pores:** First pair in 3/4 intersegmental furrow, in *cd* setal lines. **Female pores:** On 14, tiny. **Male pores:** In 14/15 intersegmental furrow, with large glands on 14 and partly 15. **Spermathecal pores:** A pair per segment in intersegmental furrows 11/12, 12/13 and 13/14.



Figs 17. *Proandricus biancae* sp. n. Clitellar region laterally: T = tuberculum pubertatis; numbers refer to segments.

Figs 18–20. *Proandricus ianthinos* sp. n. 18. Clitellar region ventro-laterally. 19. Clitellar region, ventrally. 20. Tuberculum pubertatis, ventro-laterally.

14. *Male pores*: In 15/16 intersegmental furrow. *Spermathecal pores*: In intersegmental furrows 12/13 and 13/14.

Clitellar region (Figs 15–16): *Clitellum*: Saddle-shaped, yellowish-grey, on 12–20. *Tubercula pubertatis*: Segmented, oblong ridges, on ventral edges of clitellum; on 1/n14–19. *Papillae*: On 13; a pair of very small, flat glands, in front of anterior edges of tubercula pubertatis; contain *ab setae*.

Internal characters

Septa: 4/5 thickened moderately, not muscular; 5/6 and 6/7 thin; 7/8 and 8/9 thickened moderately, however, slightly more than 4/5; all other septa thin, strong. *Gizzard*: In 7, oval. *Calciferous glands*: Lateral appendages, widely separated dorsally and ventrally, in 9. *Intestine*: Commences in 12. *Typhlosole*: Commences in 19, terminates in 73. *Dorsal blood vessel*: Doubled in 6–9; 6–7 close, 8 separated, 9 cordiform; single at crossing septa and after 9. *Paired dorso-ventral vessels*: 5–8 thin tubes, 9–11 moderately enlarged. *Nephridia*: Meganephridia.

Reproductive organs: *Spermiductal funnels*: Proandric arrangement; one pair of very large funnels, in 10; pushing posteriorly septum 10/11 occupy large part of 11; closely attached to vesicula seminales. *Seminal vesicles*: A pair of large sacs, in 10, projecting into 11. *Spermathecae*: One pair per segment of large, oblong ampullae; on the edges of 12/13 and 13/14, very close to genital glands. *Ovaries*: Not seen; probably embedded in body tissue of 13. *Genital glands*: A pair of glands in 13; each gland composed of six oblong divisions, which together constitute rosette-shaped gland.

Biological notes: The holotype was found on the bank of a small stream, under the rotten bark of a fallen tree. This bark, lying on saturated soil, was moist and semi decomposed. The paratype was, however, collected from moist, sandy soil. In both cases *mirificus* was associated with introduced Lumbricidae and *Amyntas* species.

Discussion: *P. mirificus* belongs to a group of species with the openings of spermathecae in intersegmental furrows 12/13 and 13/14; similar to *algoensis* and *marenzelleri*. It differs in the thickness of septa, and above all has enlarged spermathecal funnels and their position extended into segment 11.

The *timmianus* species group

Key to the species of the *timmianus* species group

- 1 Spermathecae in only three segments, with spermathecal pores in 11/12, 12/13, 13/14, no vestigial spermathecae 2
Note: Here I include *lesothoensis* with an unconfirmed number of spermathecae – two or three.
- Three spermathecae with spermathecal pores in 11/12, 12/13, 13/14, and three vestigial spermathecae detected only on histological slides, near septa 8/9, 9/10, 10/11 (clitellum on 12–22; tubercula pubertatis on 14, 1/n14–20)
timmianus (Michaelsen, 1933)
- 2 Clitellum commences on 11 segment, terminates on 22 (tubercula pubertatis on 15–20) ***biancae*** sp. n.
- Clitellum commences on 12, terminates on 21 3

Clitellar region (Fig. 17): *Clitellum*: Holotype: on 12–22; paratypes: 11, 12–22; saddle-shaped, extended between *cd* setal lines; segmented, whitish-grey. *Tubercula pubertatis*: Linear narrow ridges, segmented; below clitellar edges, on 15–20. *Papillae*: Single or paired on segment 16 or 21 in *ab* setal lines.

Internal characters

Septa: 4/5, 7/8 and 8/9 thickened moderately, similar in appearance and thickness; not muscular. *Gizzard*: In 7; short, muscular. *Calciferous glands*: A pair of lateral appendages, clearly separated dorsally and ventrally; adherent to oesophagus in 9, however, pushing septum 9/10 extend into 10. *Intestine*: Commences in 13. *Typhlosole*: Commences in 19. *Dorsal blood vessel*: Doubled in 5–9; 5–6 close, 7 separated, 9 cordiform organ; single when crossing septa and posteriorly to 9. *Paired dorso-ventral vessels*: 5–7 thin tubes, 8–11 progressively enlarged, moniliform. *Nephridia*: Meganephridia; small, coiled loops with short caeca.

Reproductive organs: *Spermiductal funnels*: Proandric arrangement; a pair of large funnels in 10, closely attached to vesicula seminales. *Vasa deferentia*: single ducts, deeply embedded in body wall. *Seminal vesicles*: Large, in 11, closely covering spermiductal funnels. *Spermathecae*: Single pairs of oblong ampullae, close to 11/12, 12/13 and 13/14 septa. *Ovaries*: In 13, deeply embedded in body wall. *Genital glands*: In 15 and 21 paired, large, spherical; in 16, 17, 18, small, flat, corresponding with tubercula pubertatis.

Biological notes: Collected from hard, dry, uncultivated soil, at a depth of *ca* 60 cm. Many dry casts were noticed in the ditch.

Discussion: *P. biancae* is similar to *ianthinos*. Both have three pairs of spermathecae with openings in intersegmental furrows 11/12, 12/13 and 13/14; septa 4/5, 7/8 and 8/9 are equally thickened. They differ in the position of the clitellum, and the shape of the tubercula pubertatis.

Proandricus ianthinos sp. n.

Figs 18–20

Etymology: Gr. masculine *ianthinos* = violet-coloured.

Material examined: **Holotype**: NMSA/Olig. 00544/1, Cape Province, 23 km NW of King William's Town following national road 63, opposite Debe Nek (32°48'S:27°12'E) railway station, *ca* 1 km from an area of large, hard casts of *skeadi* in pasture, from wet soil near pond, 20 January 1990, JDP & B. R. Stuckenberg leg. **Paratypes** (from the same locality): NMSA/Olig. 00544/2, 4 clitellate and 7 juveniles, 20 January 1990; NMSA/Olig. 01125/1–5, 3 clitellate and 2 juveniles, 21 November 1991, JDP & A. Zicsi leg.

Known only from type locality.

External characters

General: Body cylindrical, flattened in clitellar region and posteriorly. *Colour*: In life – dorsally violet with reddish tint; ventrally yellowish-grey. Alcohol preserved – dorsally, on the whole length of the body between *dd* setal lines, violet-brown; laterally pigmentation ends abruptly along of setal lines; ventrally – yellowish-grey.

Dimensions: Preserved and contracted: Holotype 158 mm long, 7 mm wide at 10 and 11 mm at tubercula pubertatis. Paratypes: clitellate 95–174 mm long, juveniles 56–111 mm. *Segment number:* Holotype 152, paratypes 132–190. *Prostomium:* Prolobous, small. *Segmentation:* Secondary annulation present; 1 and 2 simple, with longitudinal grooves; 3 simple; 4–9 with 2 simple ringlets, similar size and appearance; 10–11 with 3 incomplete annuli; postclitellar simple, or randomly annulated. *Setae:* Small, closely paired; first pairs on 2, then on first ringlet on all annulated segments. *Nephridial pores:* Conspicuous, in *cd* setal lines; first pair in 3/4 intersegmental furrow. *Female pores:* Minute, between *aa* setal lines, close to 13/14 intersegmental furrow. *Male pores:* In 14/15 with large glands. *Spermathecal pores:* One pair per intersegmental furrow in 11/12, 12/13 and 13/14.

Clitellar region (Figs 18–20): *Clitellum:* Saddle-shaped, segmented; light brown or yellow; on 1/n11,12–21. *Tubercula pubertatis:* Oblong, narrow ridges at ventral borders of clitellum, on 15 extending to papillae; on 1/n14,15–18,19. *Papillae:* Single or paired on one or a few of the following segments: 15, 16, 21, 22; containing *ab* setae, between *bc* lines.

Internal characters

Septa: 4/5, 7/8 and 8/9 thickened moderately; all of equal thickness, although in more mature specimens 7/8 slightly thicker than 4/5. Other septa strong, not thickened. *Gizzard:* In 7, muscular. *Calciferous glands:* Large, lateral appendages, connected to oesophagus in 9, although shifting internal part of septum 9/10 partly occupy 10; external tissue of both glands richly supplied with blood vessels. *Intestine:* Commences in 12. *Typhlosole:* Commences in 18–19; terminates 87–95. *Dorsal blood vessel:* Doubled in 6–9: 6–7 close, 8 separated, 9 cordiform; single at crossing septa and posteriorly to 9. *Paired dorso-ventral vessels:* 6–8 thin tubes, 9–11 enlarged, moniliform. *Nephridia:* Meganephridia; coiled thin loops with large V-shaped caeca.

Reproductive organs: *Spermiductal funnels:* Proandric arrangement; a pair of large funnels, closely attached (enclosed ?) to seminal vesicle of 10. *Vasa deferentia:* Single ducts run up to 15, entering into body wall at 15/16. *Seminal vesicles:* A single pair of large sacs, commencing in 10 and extending into 11; size of sacs differs in specimens, depending probably on stage of maturity. *Spermathecae:* One pair per segment; oblong, various-sized ampullae; attached to posterior edges of segments: 11, 12 and 13, with their openings in 11/12, 12/13, 13/14 intersegmental furrows. *Ovaries:* Large, rosette-shaped, in middle of 13. *Genital glands:* In 15 – paired, large, bilobed oblong glands; based on collar-like circular flat base, corresponding with glandular swellings of male pore; in 16–21 a pair of small, flat glands, containing *cd* setae.

Biological notes: The specimens were collected in a pasture land, near a small, natural water reservoir. The whole area was covered with earthworm casts. From this locality a significant number of *skeadi* was collected; the casts were probably build up by *skeadi* and *ianthinos*, and perhaps by some other, as yet unidentified species. It is impossible to establish which casts were made by *ianthinos* because turrets are adherent one to another and being erected in a period of weeks, or even months, the distinctive character of the cast of each species had been obliterated.

Discussion: *P. ianthinos* is similar to *biancae*. Both have one pair of spermathecae in segments 11/12, 12/13, 13/14, and have septa 4/5, 7/8 and 8/9 moderately thickened. It differs in the position of male pores, clitellum and tubercula pubertatis; *ianthinos* is pigmented, while *biancae* is not.

DISCUSSION

The genus *Proandricus* Plisko, 1992 was distinguished from *Microchaetus* Rapp, 1849 on the basis of the possession of testes and spermathecal funnels in segment 10. Determination of species has been based on the thickness of septa, number and position of spermathecal pores, shape and position of clitellum and tubercula pubertatis. The genus presently consists of 27 species, among which four have spermathecal pores in one intersegmental furrow (10/11 or 12/13), 19 species in two (11/12, 12/13 or 12/13, 13/14), and three in three (9/10, 10/11, 11/12 or 11/12, 12/13, 13/14); for *P. timmianus* spermathecae were recorded in six segments (Michaelsen 1933), although the spermathecae allocated close to septa 8/9, 9/10, 10/11 were seen only in histological preparations and characterised as 'rudimentary'. As similar studies have not been undertaken it is difficult to use the vestigial spermathecae for keying purposes. *P. timmianus* is, however, distinct from other species which possess three visible spermathecae (pigmentation, shape and position of clitellum, and of tubercula pubertatis).

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